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I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PS 1736 for a patent by SAFE EFFECT TECHNOLOGIES INTERNATIONAL LIMITED as filed on 15 April 2002.

I further certify that the above application is now proceeding in the name of SAFE EFFECT PTY LTD pursuant to the provisions of Section 113 of the Patents Act 1990.



WITNESS my hand this
Twenty-third day of April 2003

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APPLICANT: Safe Effect Technologies International Limited

NUMBER:

FILING DATE:

AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION

FOR THE INVENTION ENTITLED:

"FLUID COOLED BRAKE HOUSING"

The invention is described in the following statement:-

Fluid Cooled Brake Housing

Field of the Invention

- 5 The present invention relates to a fluid cooled brake housing and, to a wall for forming a fluid cooled brake housing.

Background of the Invention

- 10 It is well known that the performance of brake systems which comprise a friction pad bearing against a braking surface deteriorates as temperature of the brake increases. It is therefore desirable to cool brake systems to optimise performance.

- Various methods have been proposed for this purpose. For example, with disc brake
15 systems, which comprise disc brake pads and a disc brake rotor, it is known to ventilate the system by drilling holes through the rotor.

- In US patent No. 6,321,882 B2 the Patentee proposes attaching a heat exchanger to the
20 callipers of a bicycle disc brake system.

- In sealed wet brake systems in which friction pads and braking surfaces are enclosed
within an oil filled cavity, it is known to pass the oil through a radiator to effect cooling.

- The present invention was developed to provide a further means for cooling brake
25 systems which include some form of housing.

Summary of the Invention

- According to the present invention there is provided a fluid cooled brake housing
30 including at least:

a casing defining a cavity for housing one or more friction pads, said casing having one

or more walls, at least one of said walls provided with an internal fluid flow path, a fluid inlet in fluid communication with said fluid flow path, and a fluid outlet in fluid communication with said fluid flow path;

- 5 whereby, when a fluid supply is coupled with said fluid inlet, fluid flows through said wall via said fluid inlet, fluid flow path and fluid outlet, thereby cooling said housing.

Preferably said fluid flow path includes at least one channel between said fluid inlet and said fluid outlet.

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Preferably said fluid flow path includes a plurality of parallel connected channels extending between said fluid inlet and said fluid outlet.

- 15 Preferably said housing further includes sealing means for sealing said cavity when said housing is mounted on an axle to provide a wet brake housing.

According to the invention there is further provided a wall for a brake housing, said wall including an internal fluid flow path, a fluid inlet in fluid communication with said fluid flow path, and a fluid outlet in fluid communication with said fluid flow path;

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whereby, when a fluid supply is coupled with said fluid inlet, fluid flows through said wall via said inlet, through said fluid flow path and out said fluid outlet to cool said wall.

25 Brief Description of the Drawings

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

- 30 Figure 1 is a plan view of an embodiment of a brake housing in accordance with the present invention;

Figure 2 is a view through section A-A of the brake housing depicted in Figure 1;

Figure 3 is a section view of a wall for a fluid cooled brake housing;

5 Figure 4 is a view of section B-B of the wall depicted in Figure 3; and,

Figure 5 is a plan view of the wall depicted in Figure 3.

Detailed Description of Preferred Embodiments

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Figures 1 and 2 depict an embodiment of a fluid cooled brake housing 10 in accordance with the present invention. The housing 10 is comprised of a casing 12 which defines a cavity 14 for housing one or more friction pads (not shown). The expression "friction pads" as used throughout this specification is intended to note any form of friction pad used in a braking system for example a disc brake pad used in disc brake systems or a brake shoe used in a drum brake system, or indeed any other type of pad that can be applied to a braking surface to provide a braking effect. The casing 12 is composed of a plurality of separate walls including circumferential wall 16, back wall 18 extending across one axial end of the circumferential wall 16, and a front wall 20 extending about an opposite axial end of the circumferential wall 16. The back wall 18 is composed of a main wall section 22 and a secondary wall section 24. The main wall section 22 extends for over half the radius of the circumferential wall 16 and includes an axially extending portion 26. The secondary wall 18 extends from the axially extending portion 26 to the circumferential wall 16. Axially extending studs 28 are provided on the back wall 18 outside of the cavity 14 for coupling the housing 10 to a differential housing (not shown). An axial hole 30 is formed in the back wall 18 through which an axle (not shown) can extend into the cavity 14. The hole 30 has been circumscribed by a boss 32. The front wall 20 is also provided with a larger axial hole 34 for typically receiving a wheel hub and rotor (not shown).

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In an embodiment of the invention, one of the walls, and in this particular embodiment the circumferential wall 16, is provided with an internal fluid flow path 36, a fluid inlet

38, and a fluid outlet 40. Both the fluid inlet 38 and fluid outlet 40 are in fluid communication with, and spaced by, the fluid flow path 36. When a fluid supply (not shown) is connected with the fluid inlet 38, fluid can flow through the fluid flow path 36 and out through the outlet 40 thereby cooling the wall 16 and the housing 10.

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The configuration of the walls of the housing 10 is not in itself significant to the present invention. The walls and indeed the housing 10 is itself configured to meet the application at hand. The housing 10 depicted in Figures 1 and 2 is particularly well suited as a housing for a wet brake system where the cavity 14 houses a brake drum and brake shoes. Such a system is described in the Applicant's co-pending Australian provisional application No. PR 0187 the contents of which are incorporated herein by way of reference. In such an embodiment, the housing 10 is provided with sealing means to retain a volume of oil in which the brake components, eg the drum and the brake shoes operate. The fluid passing through the fluid flow path 36 is separate to the fluid held within the cavity 14 of the wet brake system.

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The housing 10 may also of course house a wet disc brake system comprising one or more brake disc pads and rotors. In such an embodiment, it is likely that the actual configuration of the housing 10 will vary from that depicted in present Figures 1 and 2.

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The fluid flow path 36 as shown in Figure 2 is formed with four channels 42a-42d. These channels may be series connected so as to in effect form one continuous zig-zag or serpentine channel extending between the inlet 38 and outlet 40. Alternately, and preferably, the channels 42a-42d are separate parallel connected channels as shown in the embodiment depicted in Figures 3-5 described in more detail below.

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The fluid flow path 36 can be made in a variety of ways including initially providing the circumferential wall 16 as a flat strip of material and machining a set of grooves on one surface corresponding to the location of the channels 42a-42d, providing a second flat strip of material in which a further set of grooves are machined and then attaching the two strips together so that the grooves overlay each other to form channels 42a-42d then rolling the strip about an axis to form a ring and welding the ends together. Separate

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holes can then be drilled into the strip to form the inlet 38 and outlet 40. However different techniques can also be used.

5 The fluid flowing through the channels 42a-42d circulates through a fluid circuit (not shown) which is connected between the inlet 38 and outlet 40. This circuit includes a reservoir of cooling fluid (such as water or oil), a conduit extending from the reservoir to the fluid inlet 38, and then a further conduit extending from the fluid outlet back to the reservoir. If desired, a radiator or other heat exchanger may be provided in this circuit. A pump is included in the fluid circuit to circulate the fluid through the fluid
10 flow path 36 and the reservoir and/or heat exchanger (if provided).

Figures 3-5 depict a planar wall 16' which may be used as a component of a fluid cooled housing of a different configuration to that depicted in Figures 1 and 2. More particularly, the wall 16' can be used in a housing in the shape of a square or rectangular
15 prism. The wall 16' is provided with an internal fluid flow path 36' comprising four channels 42'a-42'd. The wall 16' is made from two strips of material 44a and 44b (hereinafter referred to in general as strips 44). Each strip 44 is provided with a central region 46 inboard of its periphery in which there is formed a plurality of grooves 48a-48f. Grooves 44a-44d are parallel to each other and extend in the direction of the length
20 of the strip 44. These grooves are connected in parallel, in terms of fluid flow, by transversely extending grooves 48e at one end and 48f at an opposite end. A hole is formed in the strips 44 opening onto the groove 48e to form the fluid inlet 38, with a second hole being formed in the strips 44 opening into the groove 48f to form the outlet 40. Holes are extended through the strip 44b to form conduit attachments 49 and 50.

25 The strips 44a and 44b are formed of identical configuration with the grooves 48 being one half the depth of the channels 42'. The wall 16' is completed by attaching the two strips 44a and 44b together with their respective channels in registration. The holes forming the ports 38 and 40 in one of the strips 44a and 44b is sealed so that the holes
30 open onto one outside surface of the wall 16' only. The wall 16' can then be incorporated into a brake housing with other walls to define a casing within which there is disposed a braking system. One or more of these walls may also be of similar

construction to the wall 16'. As with the embodiment depicted in Figures 1-2, the fluid flow path 36 of the wall 16' is coupled to a fluid circuit having a reservoir, a pump and optionally, a radiator or other heat exchanger.

- 5 Now that embodiments of the present invention have been described in detail, it will be apparent to those skilled in the relevant arts that numerous modifications and variations may be made without departing from the basic inventive concepts. For example, in the illustrated embodiments, the fluid flow path 36 is depicted as being formed by two opposing grooves formed in separate components placed in facing relationship where
- 10 each groove is one half the depth of the channels. However the full depth of the channels may be formed in one component with a second plain strip being sealed thereover to seal the channels. Further, the fluid flow path 36 may be formed by other techniques such as forming or casting.
- 15 All such modifications and variations are deemed to be within the scope of the present invention the nature of which is to be determined from the above description.

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By Its Patent Attorneys
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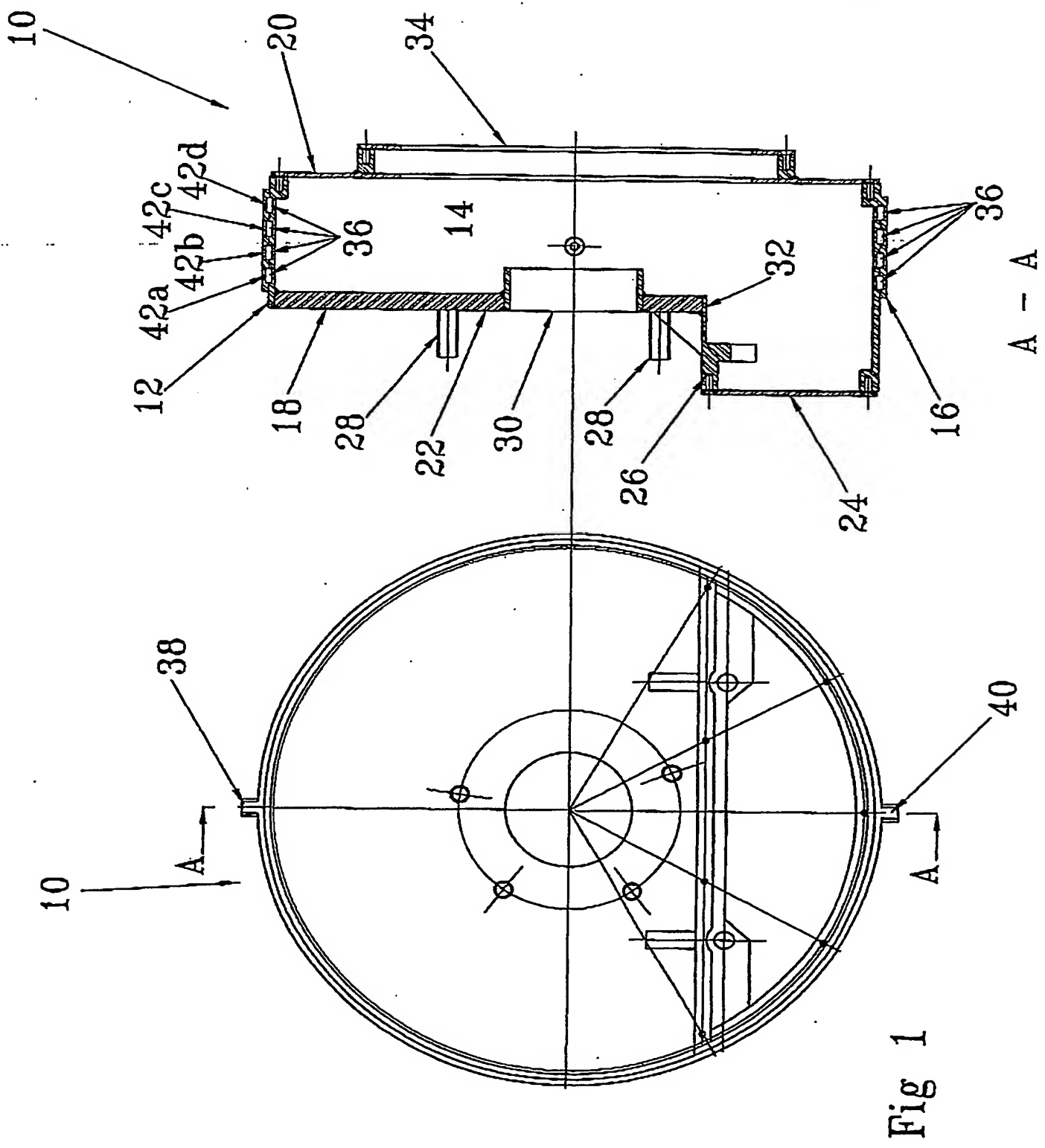


Fig 2

Fig 1

A - A

